THE TEXACO STAR

WINTER 1957-1958

New arrivals ride a river in Sumatra

A pattern of serenity belying the ardors of a Texaco affiliate's 20-year search for oil in Central Sumatra is formed by the dangling legs of Caltex Pacific employes on their way from Pakanbaru (see the map on Page 11)*—where they arrived by plane from Singapore—down the Siak River to Rumbai camp.*

THE TEXACO STAR

CONTENTS OF VOLUME XLIV • NUMBER 4 • WINTER 1957-1958

THE TEXACO STAR
A publication of
THE TEXAS COMPANY
135 East 42nd Street, New York 17, N.Y.

HOMER PAGE, who did the photographic coverage for "The Search for Jungle Oil," is a 20th Century Gulliver with cameras who has seen much of the world through view finders. For Texaco, he has pictured operations in Africa, France, and (most recently) Sumatra—where he is shown taking a jungle breather.

THE STAR is published by the Industrial and Public Relations Department for Stockholders and Employes: **Thomas D. Durrance,** Director of Public Relations • **Ellis Prudden,** Editor; **Gordon Bowman,** Staff Writer; Irwin Glusker and Dick Hendler, Co-designers • Printed in the U.S.A.,

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Two Texaco Scientists Honored by American Chemical Society

Important advances in petroleum science achieved by Eastman and Eischens have great significance for industry in general and the public at large

Without scientific research, the petroleum industry in 1958 probably would not be too much different than it was in 1908. Scientific study has meant the difference between old-time doodlebugging and modern oil exploration that relies on sensitive seismic equipment; the advance from distilling small batches of crude oil to continuous catalytic cracking techniques that have pushed gasoline quality and yields higher and higher; and scores of other forward steps by the industry over the years.

Scientists in the oil industry—some of them tracking down fundamental knowledge about the petroleum hydrocarbons with which the industry works, simply to add to our store of information; others applying that knowledge to the solution of practical problems—have given oilmen a constantly expanding base of fact to replace guesswork.

Two such scientists, working quietly and persistently in the Company's research laboratories at Montebello, California, and Beacon, New York, recently were given the sort of recognition that comes to a man of science very rarely: an American Chemical Society Award.

For the two, the awards represent great personal accomplishment. For The Texas Company, they are tangible proof of a fine research organization working to help provide better products, more efficient processes, and more and more knowledge about the materials and methods Texaco uses. Although these ACS awards focus a spotlight on two Texaco scientists, the Company's hundreds of scientists—as a group—are steadily contributing to petroleum advances that benefit people at home, traveling, and at work.

On September 9, 1957, at its Fall national meeting in New York, the American Chemical Society announced that it was honoring Texaco scientists duBois Eastman and Robert P. Eischens—the 1958 ACS Award in Industrial and Engineering Chemistry to Eastman; the 1958 Precision Scientific Company Award in Petroleum Chemistry to Eischens. This was the first time in the history of its annual awards that the Society had honored two scientists in a single industrial research organization. Presentation of the awards will be made at the ACS meeting in San Francisco in April.

Eastman, who is Director of Texaco's Montebello Research Laboratory, has spent nearly all of his professional life in the area of applied research—and is responsible for the development of a new method for manufacturing hydrogen which has found world-wide application. Eischens, of the Texaco Research Center, has devoted his career to fundamental research. Out of his probing for the basic chemical facts related to petroleum will come practical applications important to the industry and, ultimately, to the public.

Brief descriptions of the work for which duBois Eastman and Robert Eischens have been honored appear on Pages 4 and 5. With their awards goes a tribute to all petroleum scientists, and an appreciation of the contributions science continues to make to the success and value of the petroleum industry. CONTINUED ON PAGE 4

DU BOIS EASTMAN *is a Californian. Born in Berkeley in 1906, he was graduated from the University of California in 1928 with a B.S. degree in Petroleum Engineering. That same Summer he became a Texaco employe—beginning his career as a Chemical Engineer in the Domestic Producing Department at Long Beach. After little more than two years in Producing, he was assigned to the new research laboratories Texaco was opening in Beacon, New York. His interest and ingenuity in solving processing problems, with a sharply practical turn of mind, already had marked him for a research career. Subsequently, he served as Director of the Cracking Research Department at Port Arthur Works; as Chairman of the Technical Advisory Committee of the Neches Butane Products Company during World War II, and as Assistant Director of Research at New York and Montebello. He has headed Texaco's synthesis process research at Montebello since 1946 and has been Director of Research there since 1954. As evidence of his creative talents, duBois Eastman has to his credit a total of 36 U. S. patents—and some 80 foreign patents on which his name appears either as sole or joint inventor.*

ROBERT P. EISCHENS, *who was born in Glenmore Township, North Dakota, in 1920, began his association with the petroleum industry after receiving a B.S. degree at the University of Wisconsin in 1942. That year, he joined the Sinclair Refining Company—working first in a pilot plant for high-pressure catalytic processes, later in a catalyst preparation laboratory and the catalytic cracking division. Graduate studies led to his receiving a Ph.D. degree in Chemistry at Northwestern University in 1948, the year he joined The Texas Company as a Chemist in the Physical Research Department at the Texaco Research Center, Beacon, New York. On four occasions Dr. Eischens has spoken before the Gordon Research Conferences. In 1956 he was invited by the Bunsen Society to give a main introductory lecture at the meeting in Freiburg, Germany. Dr. Eischens' work at Beacon—where he now is Physical Research Associate—is fundamental. It is concerned explicitly with the search for new knowledge about our physical universe. Observing it recently, a visiting university professor remarked to a member of the staff at the Center, "Well, I see you* really *do some research here."*

"To stimulate fundamental research in industrial and engineering chemistry and in the development and application of chemical engineering principles to industrial processes."

ACS Award in Industrial and Engineering Chemistry

Combined with duBois Eastman's talent for directness of thought in research is his ability to cut through convention.

So far, the career of duBois Eastman can be marked off fairly neatly into three professional periods. From 1931 to 1942, he concerned himself with catalytic operations research. This period marked a time when the industry was striving to raise the quantity and octane quality of gasoline to be refined from a barrel of crude oil, in order to meet the next big power surge of the auto makers. Throughout it, Eastman was occupied with basic research on petroleum cracking. He set up small-scale units for fundamental studies of reaction characteristics, pilot plants for studying operational data and procedures.

Out of this period came a great mass of data and improvements in cracking and reforming processes—increasing both the quality and yield of high antiknock gasolines – which went far to make Texaco the acknowledged leader in thermal cracking developments.

During World War II years 1942-44, Eastman was called on to act as chairman of a Government technical committee set up to plan a butadiene manufacturing plant which would help meet the urgent wartime need for synthetic rubber.

Up to this time, butadiene had been derived from alcohol – expensively and in limited quantities. The problem of the committee (it was formed of scientists from several companies in the industry) was to raise butadiene availability by finding a way to produce it from petroleum sources. There was no time for lengthy pilot-plant studies of new processes: what the committee learned in laboratory studies had to be translated almost directly to full-plant operation – an operation in which Eastman's long habit of working up new processes in the lab for virtually direct simulation in the field found new scope. As a result of the committee's work, under Eastman's leadership, a plant went on stream at Port Neches, Texas, almost without a hitch. It was the biggest and most efficient of all the butadiene plants built during the war, and still is.

After the war, Eastman plunged back into process development for peacetime application. Working in the Company's newly opened laboratory in Montebello, he first turned to the means for producing synthetic fuels from natural gas. Again, Eastman demonstrated his talent for cutting through convention to accomplish what others consider too unorthodox to be feasible. ("Doing conventional things in unconventional ways," is the way one colleague describes the knack.) New methods which many had considered unsafe were proof-tested by Eastman and through this approach he brought forth the synthesis gas process.

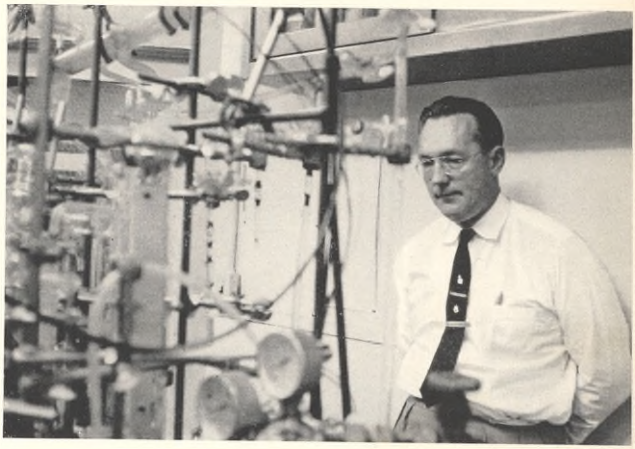
When new petroleum reserves were uncovered shortly after the end of the war, and the concern over crude oil shortages dimmed, Eastman began turning his new process to other uses: principally as the root of synthetic chemical production. At the same time, he began finding new raw materials to be fed into the process. As a result, the *Texaco Synthesis Gas Generation Process* is today a development of great importance, world-wide.

The first plant to use the process in making ammonia was started only a little over three years ago. Today 25 such plants which will depend entirely on the process are operating or under construction.

The future of the process is extremely promising: cheap synthesis gas or hydrogen is widely applicable to many industries. Right now, Eastman's process is being investigated for many types of chemical synthesis, for the reduction of metals, and for the generation—mainly in Europe—of manufactured gas from heavy oils or raw coal. It is, of course, a key to the production of synthetic liquid fuels.

"To recognize, encourage, and stimulate outstanding research achievements in . . . petroleum chemistry in the United States and Canada."

Precision Scientific Company Award in Petroleum Chemistry



Concerned more with abstractions than practicalities, Dr. Robert P. Eischens ponders basic truths of oil chemistry.

In *The Columbia Encyclopedia*, there is an explanation of catalysis that concludes with these 10 words: "The exact way in which catalysts act is little understood." Through his fundamental research Dr. Robert P. Eischens has provided the petroleum industry with a new technique which allows workers in this field to "see" for the first time some of the things that happen on the surface of a useful catalyst.

Considering that catalysis plays a fundamental role in the production of many important petroleum products–high-octane gasoline, for one–this new knowledge is a valuable contribution. It is the result of long years of study and experimentation to achieve basic truths, and will stimulate additional advances required to provide the best catalysts for making future oil products.

Robert Eischens has pioneered three different basic advances in the understanding of catalysis. His first outstanding contribution was made while he was a graduate student at Northwestern University.

There, he was able to show that a measurement of the magnetic properties of one group of catalyst systems could be used to gain a better understanding of catalyst surface structure. (One type of petroleum refining catalyst is a fine powder used to make chemical reactions move faster and under better control. Knowledge of the nature of the surface of these powders, and the way chemical molecules react with this surface, is essential to an understanding of the way catalysts function in petroleum processing.)

His initial research for Texaco dealt with iron powder catalysts of the type used to synthesize hydrocarbons by catalyzing the reaction between gaseous carbon monoxide and gaseous hydrogen.

Using carbon monoxide containing radioactive carbon atoms, Dr. Eischens was able to show that the surface of these iron powders is heterogeneous in a special way–namely, that there are a few essentially homogeneous portions, each different from the other, rather than a large variety of different surface types (this was done by studying the molecule-for-molecule exchange between ordinary carbon monoxide gas above the iron powder and radioactive carbon monoxide strongly bonded to the iron surface).

Here was a very basic truth which led to more experimenting, more knowledge of great potential value. Interpreting such highly specialized work for the non-scientific person is virtually impossible: but the importance of it *can* be demonstrated by the fact that four different technical publications reported on it at length and with great enthusiasm.

The third and most recent line of study undertaken by Eischens has enabled him and his associates to "see" for the first time the way in which many different types of petroleum and related molecules are bonded to the surface of a solid catalyst. Working out methods of obtaining "pictures" of the molecule sitting, as it were, on the surface of the catalyst, Eischens led petroleum science one step closer to an understanding of catalysis.

This line of research, which has won Dr. Eischens and his colleagues world-wide recognition, has been described in several publications.

Eischens' infrared studies of molecules bonded to a catalyst's surface have provided definite answers to many questions in catalyst chemistry on which scientists could only speculate before the development of the Texaco researcher's methods. These studies are considered by experts to be among the most powerful and promising ever developed for the fundamental study of catalysis. They also hold great promise for basic discoveries in the fields of lubrication and corrosion. •

WHAT IS BEHIND TH"P

Under pressure exerted by Congressional Subcommittees, the Department of Justice has announced an investigation of the pipe line industry. An understanding of the major issues involved will enable Texaco stockholders and employes to evaluate reports expected in the press

IEPIPE LINE INVESTIGATIONS"?

by E. H. Schlaudt

ATTORNEY, LEGAL DEPARTMENT, THE TEXAS COMPANY

A "Special Message to Stockholders and Employes of The Texas Company," calling attention to a report issued by the Senate Judiciary Committee's Subcommittee on Antitrust and Monopoly, was inserted in the Fall issue of THE TEXACO STAR.

Primarily that report related to the oil lift to Europe, but it also contained charges that domestic crude oil and products pipe lines were engaged in monopolistic practices. Although Senator Dirksen's dissenting report branded these charges as "unwarranted," "groundless," "unsupported and erroneous," the report of two Senators recommended that the Department of Justice initiate an investigation of the pipe line industry and its practices.

Shortly after this report was released, the Special Antitrust Subcommittee of the Judiciary Committee of the House of Representatives began an investigation of the results obtained from settlement of antitrust actions by consent decrees. The House Subcommittee held several hearings, one of which dealt with a pipe line Consent Decree entered into in 1941. During this particular hearing, Assistant Attorney General Victor R. Hansen and three members of his staff were kept on the witness stand for two full days. The line of questioning and the phrasing of the questions attempted to create the impression that the industry had circumvented, or disregarded, the 1941 Consent Decree, and that the Department of Justice had stood idly by and done nothing to enforce it.

In October, 1957, apparently in order to ease the pressure of these attacks, Assistant Attorney General Hansen announced that the Department of Justice had begun a full-scale investigation of possible monopolistic practices by pipe lines owned by major oil companies, and further that the Department of Justice had commenced four actions alleging violations of the 1941 Consent Decree.

It is possible that there will be more about these investigations and court actions in the press during coming months, and an understanding of the major issues involved will enable Texaco stockholders and employes to evaluate such reports. Briefly, this is the background of the 1941 Consent Decree:

In 1940, the Department of Justice brought action against the American Petroleum Institute involving a vast collection of antitrust and monopoly charges against the entire oil industry, so varied and so broad in scope that they were referred to collectively as "The Mother Hubbard Case." There were 367 defendants involved. (This case was finally dismissed without a trial in 1951.)

In 1940, the Department of Justice also brought three actions alleging violations of the Elkins Act, an act dating from 1903 which prohibits a common carrier from discriminating in the tariffs or rates which it charges its shippers, and from making rebates to a shipper which is also an owner or stockholder of the carrier. The Department of Justice made it known to the industry that these three cases were merely the "opening guns," and that it had some 90-odd additional complaints ready for filing in the courts.

The basic premise for all of these actions was the contention by the Department of Justice that dividends paid by the pipe line companies to their parent companies were unlawful rebates within the meaning of the Elkins Act. Since the Elkins Act provides that a shipper-owner receiving an unlawful rebate from a common carrier must pay to the Government a penalty equal to three times the amount of the unlawful rebate, these cases potentially involved large amounts.

In the opinion of industry counsel, Congress had not intended that the Elkins Act should be applied so as to prohibit a pipe line company from paying dividends to its owner company, and the industry prepared to fight these cases. However, early in 1941 the Department of Justice indicated that it might be receptive to negotiations for a consent decree which would settle both the "Mother Hubbard" and the Elkins Act cases. At that time, although this country was not yet involved in the European conflict, it was becoming increasingly evident that the American oil industry was going to be called upon to play a leading role in the struggle against totalitarianism. The industry therefore decided that it would be in the best interests of the country and the industry and its stockholder-owners to make a good-faith effort to arrive at a reasonable settlement of these cases.

For months, negotiations went on between industry

counsel and Department of Justice representatives. Initially, an attempt was made to draft a single consent decree which would settle all of the issues involved. Then in June, Harold Ickes, who was Petroleum Coordinator for National Defense, made his widely publicized recommendation for the construction by the oil industry of the "Big Inch" pipe line from Texas to the East Coast. He recommended that construction start as soon as the industry could mobilize itself for such a tremendous undertaking. Consequently, in the interest of expediency, the industry-wide issues involved in the "Mother Hubbard" case were separated from the pipe line issues involved in the Elkins Act cases, and in mid-July of 1941 negotiating teams began to concentrate on a consent decree which would cover the Elkins Act issues only.

The industry lawyers contended that dividend payments were not rebates within the meaning of the Elkins Act, but rather were perfectly proper and lawful returns on the value of the assets used for common carrier purposes. The Department of Justice conceded that dividend payments which did not exceed a reasonable rate of return were not illegal rebates. The question then became:

"What is a reasonable rate of return?"

The industry at first took the position that a 10 per cent return on crude lines and an 8 per cent return on products lines were reasonable, since these were the rates of return which had been established or approved by the Interstate Commerce Commission in recent rate hearings. The Department of Justice started with a very low percentage, but eventually came up to 6 per cent on both product and crude lines. Finally, only a short time before the bombing of Pearl Harbor, it was agreed by both sides that dividends not in excess of 7 per cent of the valuation of the common carrier's property would be deemed not to be violations of the Elkins Act.

The 1941 Consent Decree contains several other important stipulations, but it is essentially the proper interpretation of the language "seven percentum of the valuation of such common carrier's property" which is at issue in all four of the present actions.

Like all consent decrees, the 1941 Decree represents a compromise between the industry and the Department of Justice. The final draft was prepared under the pressure and urgency of impending war. It represented the combined efforts of top legal and management talent in both the industry and the Government, yet much of the language used was a compromise in wording. Consequently, all parties concerned were conscious of the fact that certain phrasing in the Decree had to be interpreted and construed in the light of the circumstances under which the Decree was accepted.

In order to assist the industry in answering any questions which were then arising during the course of the preparation of the pipe line companies' first annual reports which each defendant common carrier is required by the Decree to file with the Attorney General by not later than April 15 of each year, the industry negotiating committee reconvened in December, 1942. The Texas Pipe Line Company—a wholly owned subsidiary of The Texas Company—prepared and filed its original report for the year 1942 on the basis of the interpretations made by the negotiating committee during that 1942 meeting. It has consistently prepared and filed its reports on the same basis each year since then. Until the Fall of 1957, these reports have been accepted as filed by the Attorney General without question throughout the entire 16 years since the date of the 1941 Consent Decree.

Each of the four cases currently pending under the Elkins Act involves a similar background situation. That is, the alleged violations consist of practices which have been consistently reported to and accepted by the Department of Justice from the date of filing of the particular pipe line company's first annual report to the present date.

In one case, Tidal Pipe Line Company is alleged to have paid excessive dividends because it computed allowable 7 per cent dividends on the basis of a valuation which included not only facilities owned and used by it, but also facilities *leased to and used by it* for common carrier purposes. Although in doing this, Tidal has followed the practice which was established by the Interstate Commerce Commission for pipe lines in the early 1930's and for railroads in the early 1920's, the Department of Justice claims that the proper interpretation of the Decree would exclude leased property from the valuation base of both lessor and lessee.

In another case, the Justice Department has charged that The Texas Pipe Line Company also has computed allowable dividends on the basis of a valuation which included leased property used for carrier purposes. However, this case differs from Tidal's case in that there is no charge that Texas Pipe Line has paid excessive dividends. At most, Texas has been charged with nothing more than a mere technical failure to comply with the reporting provisions of the Decree.

Answering these allegations, the president of The

of the 1941 Consent Decree

Texas Pipe Line Company declared that his company always has "scrupulously complied with every provision of the Consent Decree."

He went on to say that although the company did not agree with the Justice Department's interpretation, "We have consistently reported the valuation of leased property separately, so that regardless of which of two possible interpretations of the Decree is correct, all required figures have been shown."

In still another action, Service Pipe Line Company has been charged with violation of the Decree by the inclusion in the pipe line company's valuation of a pro rata proportion of newly constructed facilities completed during the year. This case raises the question of whether a pipe line company can, under the Decree, include in its valuation a proportion of the value of newly constructed facilities, such proportion being determined by the number of months the facility was actually in service during the year. The Department of Justice says that this is improper—that new facilities may not be included in valuation until the year following the year of completion.

In the fourth case, the Department of Justice alleges the Arapahoe Pipe Line Company has violated the terms of the 1941 Decree "by failing to deduct from the valuation of its common carrier property, before computing its shipper-owners' permissible dividend, the share of the valuation of such property financed by or attributable to loans . . . from third parties."

Of the four cases, this is by far the most important to the pipe line companies. What the Justice Department is saying, in effect, is that the Consent Decree valuation of a company's properties must be computed only on the basis of its equity capital—not including debt financing. Since it has been necessary for most pipe line companies since World War II to raise outside-the-company money for new construction and other improvements, almost every pipe line now operating is financed to a considerable extent by borrowed funds. Should the Justice Department win the principle involved in the Arapahoe case, the pipe line companies would be allowed to pay dividends on only a relatively small percentage of the total valuations of all of their assets.

These four test cases are focused solely upon interpretation of the 1941 Consent Decree under the Elkins Act. They do not involve antitrust or monopoly charges, and any press reports concerning them should be construed in this light: that the only issue involved is the proper interpretation of the Consent Decree. •

The interconnection of a great many highly efficient pipe lines makes it possible to ship a gallon of crude from a Texas oil field to a refinery in the region of the Great Lakes for less than the cost of mailing a post card the same distance. Without this network of crude and products lines, the cost of gasoline and fuel oil would be considerably higher than it is today. Above is the manifold of The Texas Pipe Line Company's pumping station at Patoka, Illinois, where crude oil from West and North Texas passes en route to Texaco's Lawrenceville and Lockport Works.

Directors Make Midwest Inspection Trip

Texaco Directors at Lockport Works (left to right): *G. N. Aldredge, O. J. Dorwin, J. S. Leach, J. W. Foley, A. C. Long, W. H. Mitchell, W. J. Cummings, A. N. Lilley, R. C. Shields, C. L. McCune, and C. B. Barrett (W. S. Gray, H. U. Harris, L. J. Norris, and W. S. S. Rodgers were not present when picture was taken). At far right is H. A. Lord, Lockport's Superintendent.*

The first meeting ever to be held in Chicago by Texaco's Board of Directors took place on November 21, 1957. Following the Board meeting, the Directors made a tour of inspection of Company facilities in the region, during which they surveyed a new Texaco petrochemical plant at Lockport, Illinois, and improvements to Texaco's 65,000-barrel-a-day refinery there.

Tours of inspection, such as this one to the Midwest, periodically are taken by Texaco's Directors to familiarize themselves at first hand with the progress of significant Company developments.

One hundred and eighty tons a day of ammonia for fertilizers and other industrial purposes will be produced in the new petrochemical plant. Also being completed at the Lockport Works is the conversion of a hydroformer, constructed during World War II, into a catalytic reforming unit to produce high-octane gasoline. The new unit will almost double the refinery's reforming capacity, bringing it to 19,000 barrels a day.

On tour, President Foley (left) *and Chairman Long study processing chart.*

Members of the Texaco Board of Directors attending the meeting in Chicago:

Augustus C. Long, New York, Chairman; Geo. N. Aldredge, Chairman of the Loan Committee, First National Bank, Dallas; C. B. Barrett, Senior Vice President at Houston; W. J. Cummings, Board Chairman, Continental Illinois National Bank and Trust Company, Chicago; Oscar John Dorwin, New York, Vice President and General Counsel; J. W. Foley, New York, President; W. S. Gray, Board Chairman, The Hanover Bank, New York; J. S. Leach, Houston, former Board Chairman; A. N. Lilley, New York, Vice President, Foreign Operations-Eastern Hemisphere; C. L. McCune, President, The Union National Bank, Pittsburgh; W. H. Mitchell, Chicago, Partner in Mitchell, Hutchins & Co.; W. S. S. Rodgers, New York, former Board Chairman; R. C. Shields, Director and Officer of Fisher & Company, Detroit. •

In a time when travel to far pla
is one of the favored diversions
Americans, the United States
man probably holds the champi
ship for distance and variety. The
are few areas of the free world th
he has not explored during the l
30 years. Europe, Canada, Afri
Latin America, the Middle E
Australia, the Far East—all h
held his interest. In many pla
overseas, the search for petrole
has led to important discover
And invariably the production of
has brought double benefits: a m
decentralized – and therefore l
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available to the free world; n
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the country in which the oil ope
tions are conducted. The world tr
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guided and, in fact, made imper
tive by the sobering knowledge th
the oil we consume can only be r
placed by the oil we discover. A
too, by the fact that oil rarely, ve
rarely, is where you would like it
be. It must be hunted out, oft
where nature is least cooperat
and most forbidding. Explorati
and development are immensely e
pensive and always risky underta
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foreign lands, searching for pet
leum often means intense hardsh
in heat and cold, jungle and dese
mountain and swampland. But co
tinued exploration for and develo
ment of oil reserves wherever th
may be found is essential to the fr
world's security and welfare. O
very gratifying example of a s
cessful search for foreign oil wh
nature presents many obstacles l
in the story of Texaco's operati
in Sumatra, told on Pages 11-

THE SEARCH FOR *Jungle Oil*

After heavy rain, scrapers move in on the Duri-Dumai road to get it back in condition for travel. Clearings for roads in Central Sumatra are 11 times actual road width, so sun can help dry them.

Making their way through swampland on bridging, loggers (above) *head for trees used as corduroy road base.* (Below) *Bulldozer clears bush around camp along the Duri-Dumai road.*

Sumatra

The oilman faces a forbidding array of obstacles

Drenching rain—100 to 120 inches of it in a typical year—is one troublesome aspect of oil exploration and production in Sumatra. Marauding tigers is another, which accounts for the raised sleeping platform the Caltex Pacific seismic survey party, in the photograph at the left, has put up over its Central Sumatra camp site.

Since 1937, Caltex Pacific (one member of the Caltex group of companies, which is 50 per cent Texaco owned) has been pushing back the Central Sumatran wilderness to get at the oil deposits it covers. Seemingly endless rainy periods; a dripping, tangled jungle; and the interruption of World War II—all have slowed the work.

Progress made by 1941 was almost completely lost during the war years, and Caltex crews returning to the sites they had been forced to abandon when war broke out found their old clearings completely grown over. But today the 1,000-mile-long island—it's the world's sixth largest—represents one of the brighter spots in Texaco's overseas operations. If Sumatra's wilds have not yet been completely tamed, they have been controlled and made productive. At the Minas field, located almost squarely in the middle of the island,

Sumatra

Jungle and swamp make the going rough for geophysical crews

about 160,000 barrels of crude oil are being brought to the surface daily.

Like most of Indonesia (a sprinkling of 3,000 islands strung along the Equator between the Asian mainland and Australia), Central Sumatra was just about roadless when Caltex Pacific teams began moving back into it after the close of the war.

Getting at the sites picked for drilling (on the basis of a combination of surface geology, extensive seismic survey, and aerial survey) meant an incredibly difficult road-building job. Since the start of its Sumatran operations, Caltex Pacific has cleared more than 300 miles of road through the dense tropical jungle in Central Sumatra.

Trees are felled to form footbridges at many points along trails that extend from roads across swamps to exploration camps.

Deep in the jungle, men of a geophysical exploration party prepare (above) *for seismic explosion.* (Below) *A seismogram—end result of explosion—is scanned as soon as developed.*

In order to create a satisfactory nine-yard-wide road, construction crews must hack out a strip of jungle 100 yards across, so the sun can slant into the clearing and help dry the roadbed. The terrain is rough, patched with swamp, and practically solid with vines and heavy-leafed timber. It features nearly everything the road builder does not want. It lacks, almost completely, the one thing he needs: stone aggregate to give the roads a solid bed.

As a substitute, crude oil from the Minas field is mixed with the bulldozed soil to give the earth some degree of stability. Even so, heavy rain turns the roads into a clawing ooze that makes four-wheel drive common on passenger cars and brings out chains and heavy-duty tires on vehicles with standard transmissions. TEXT CONTINUED ON PAGE 19

Sumatra

Building and repairing are never-ending tasks as operations are expanded

Indonesian workers (right) *carry oxygen tanks on dock at Dumai. Oxygen is later used by skilled Sumatran welder* (below) *to make repairs on a worn road scraper.*

Housing—prefab units above and left are being erected at Rumbai camp—is provided for employes of Caltex Pacific. Also at Rumbai are a hospital, commissary, club house, and swimming pool.

Pile driver used in constructing the new freight wharf at Dumai provides work for Sumatrans, who become expert workers with on-the-job training.

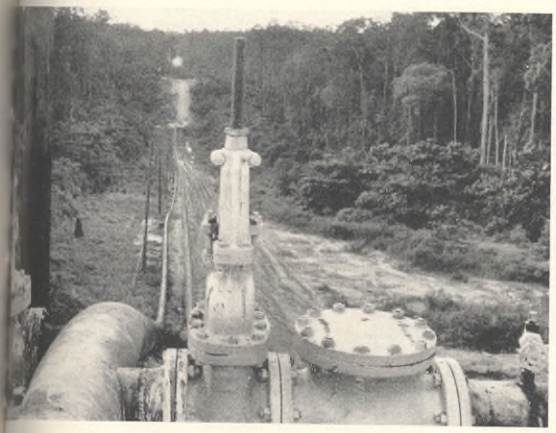
In machine shop at Pakning, trainee mechanics learn how to repair internal combustion engines.

Fill for the Dumai road is scooped up for waiting truck. Road is part of island-spanning highway.

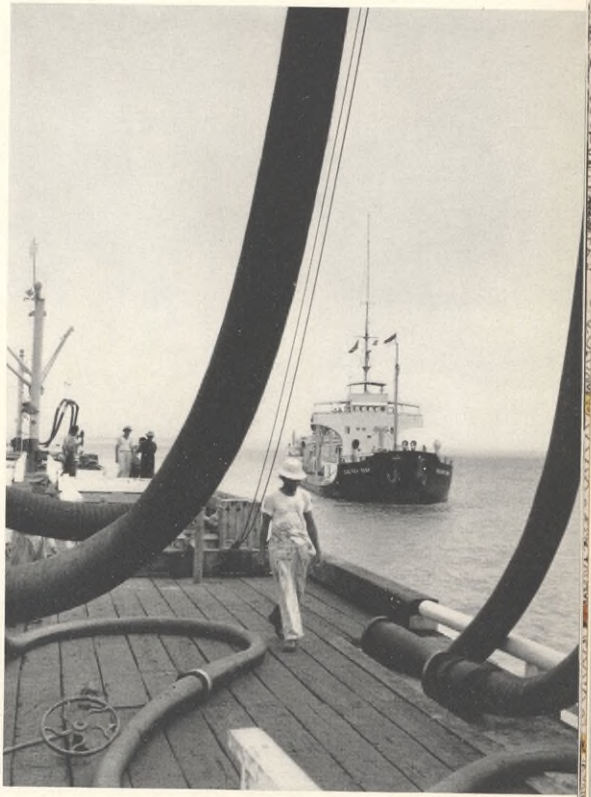
(Above) *The mast of a portable drilling rig, which has just been erected in the Duri field, rises above the thick growth of jungle surrounding the area cleared for the drill site.* (Right and below) *Members of the drilling crew perform tasks that call for a high degree of skill and precise teamwork.*

Sumatra

The search is difficult—but successfu



Pipe lines carry crude oil from Minas field to Perawang Terminal on Siak River. There, crude is loaded on tankers for Pakning.



(Above) *The* Caltex Siak, *loaded with crude, arrives at Pakning.* (Left) *Traffic control room at Pakning, where radio contact is maintained with river tankers.*

Moving Minas crude through the jungle to the Siak River, 20 miles away, gave Caltex Pacific another transportation problem. This one was solved with pipe lines—over 200 miles of pipe for flow lines, gathering lines, and trunk lines that funnel the crude into the terminal at Perawang, where it is loaded into river tankers and headed for the terminal at the seaport of Pakning.

Shuttling from Perawang to Pakning, up and down the tannin-stained Siak—the river is dark, but clear, and reminds most visitors of very strong tea—are 13 Caltex Pacific river tankers. Specially designed to create as little wake as possible, since along the 93-mile trip there are dozens of *kampongs* (villages) on the water's edge and a fairly heavy traffic of native craft, these river tankers travel more than 40,000 miles a year without ever leaving the jungle. Their masters and crews are expert at navigating the Siak. They have to be. The river is narrow and twisting; it meanders through the jungle in a series of tortured turns that challenge the ablest pilot.

Eventually, probably within several years, these tankers plying the Siak will be replaced by a pipe line system which will link Minas field with a deep-water terminal near Dumai. This direct link will bring substantial savings, in terms of both time and money, over the present river haul from Perawang to Pakning.

Other expansion plans call for the development of two new oil fields, Duri and Bekasap, about 35 miles north of Minas. Crude oil from these fields, too, will be pipelined through the jungle to the coast. Actually, the Duri-Bekasap section of the line to Dumai will be completed first, and then will be tied in with Minas.

The geography and the topography of Sumatra have created special problems for Caltex Pacific. Sumatra's

Auto on road to D seems to symbolize change and progress has brought to the gle in Central Sum

Indonesians and Americans at Rumbai camp enjoy rice table buffet (above) *and after-dinner conversation* (right) *at* makan-makan *(dinner party). At Duri* (left), *Indonesian employe takes part in discussion of geophysical data.* (Below) *Rumbai's commissary is a good place to chat.*

Sumatra

Nationals and expatriates have become friends and neighbors in the search for oil

people, though, have provided special rewards. Quick and eager to learn, ingenious, wise in a way that only he who has lived by the jungle watchword "Hati-hati" (be alert) can be, the Indonesian grasps modern industrial techniques with a willingness and an adroitness that would be extraordinary anywhere.

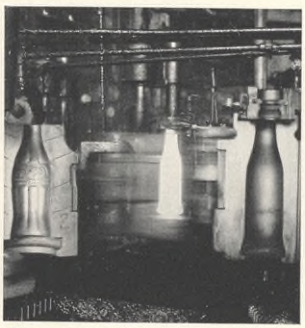
In Sumatra, the pairing of the American oilman's technical skill with the Indonesian's ability to learn quickly and his enthusiasm for progress has been particularly happy. One good reason: a substantial part of the millions of dollars invested in the exploration, production, and development of Sumatra's oil reserves has gone into schools, housing, roads, and medical facilities for oil company employes—the great majority of whom are Indonesian citizens.

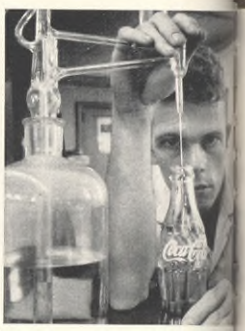
The road between Duri and Dumai will be completed by Caltex Pacific early in 1958, providing the last link in the first trans-island highway ever to cross Sumatra. This new road is expected to open a vast new area for commercial and industrial development. It will be a powerful symbol, for a region that was almost without roads 10 years ago, of the progress petroleum has made possible.

Photographs by Homer Page

100,000,000

Glass is still a mystery. Men have been making it for 4,000 years and no one yet knows why it behaves as it does." The speaker was Joseph Venable, a Tennessean who knows more than most do about the mystery of glass. As an employe of the Chattanooga Glass Company, he created the formula used in the manufacture of 100,000,000 Coca-Cola bottles a year, the firm's principal product. Glass is mostly sand and soda ash, transformed by an ordeal of fire into a curious liquid that has the characteristics of a solid. Volcanoes produce glass, and so does lightning when it strikes sand. Man does it in dramatic imitation of these natural furies. While Venable talked, raw materials mixed according to his formula were being fed into 200-ton furnaces, which rage constantly at about 2,800 degrees F. From the furnaces, molten glass was flowing to assembly lines—so incandescent that when it was shaped into bottles they were actually put through another, lesser inferno for cooling. Though he knows exactly how to get the results he wants, neither Venable nor any other craftsman actually knows what happens in the fires to make the ingredients of glass hold together. But the important thing men *have* learned is how to fashion glass into the containers they need, in quantities to meet today's huge demand. Even this knowledge is relatively recently acquired—in step with the development of the oil industry, as a matter of fact. In 1901, when the Chattanooga Glass Company was founded, glass containers were still made as they were 300 years before Christ, by craftsmen using a blowpipe and a mold. Two years later came the invention of machines that substitute compressed air and the assembly line for a man's lungs and hands. Petroleum was the inevitable partner in progress. Today, the Chattanooga Glass Company uses more than 8,000 gallons of oils a month for its mass-production molds and machines. Texaco supplies them. •





Molds are still finished by hand (left) *as they have been for centuries, but today's molds are used for mass production. Molten glass in second picture has been shaped by rough mold, will be grasped by finished mold and blown by compressed air. A problem in glassmaking is shrinkage, and human skills remain important. Periodic weighing test on assembly line, painstaking measuring test in laboratory, are devices by which 100,000,000 bottles a year are kept to exact standards.*

MYSTERIES A YEAR

Conveyor belt moves bottles into annealing lehr, the tunnel-like oven in which gradually lowered temperatures relieve stresses in the glass.

The Chattanooga Glass Company, an industrial account served by Texaco, puts an ancient art to work on a modern mass-production, assembly-line basis

T. C. TWYMAN

A. NEIL LILLEY

HARVEY CASH

Executives in New Positions

On December 20, 1957, the Board of Directors elected T. C. Twyman as Senior Vice President in charge of coordinating Texaco's world-wide sales interests and activities, effective January 1, 1958. Mr. Twyman formerly was president of McColl-Frontenac Oil Company Limited, Texaco's principal Canadian subsidiary. His headquarters were in Montreal but will now be in New York. A. Neil Lilley, who has resigned as Vice President and Director of The Texas Company, was elected by the McColl-Frontenac board to succeed Mr. Twyman as president of the Canadian firm. Harvey Cash, formerly Assistant to Texaco's Board Chairman, was elected Vice President in charge of Foreign Operations-Eastern Hemisphere, succeeding Mr. Lilley.

Beginning his career with Texaco in 1930, Mr. Twyman joined McColl-Frontenac Oil Company Limited as a director and vice president in charge of sales in 1942. He was elected executive vice president in 1946 and president and chief executive officer of McColl-Frontenac in 1952.

Joining Texaco in 1933, Mr. Lilley entered the Company's foreign operations following World War II, serving in France. He returned to New York in 1949 as General Manager of Foreign Operations-Eastern Hemisphere, was elected a Vice President in 1951 and a Director in 1954.

Entering Texaco service in the Producing Department in 1933, Mr. Cash was made Assistant Manager of the Foreign Operations Department-Eastern Hemisphere in 1953. He became General Manager in 1954, was appointed Assistant to the Chairman of the Board of Directors in 1956. •

★ BRIEF AND POINTED ★

All properties in Trinidad of The Trinidad Oil Company Limited have been transferred to Texaco Trinidad, Inc., a Delaware corporation registered in Trinidad, effective January 1, 1958. Both Trinidad Oil and Texaco Trinidad are wholly owned by The Texas Company. Trinidad Oil was purchased by The Texas Company in 1956. It was liquidated in accordance with rulings and agreements given by the British and Trinidadian governments at the time the stock of Trinidad Oil was purchased by The Texas Company. Transfer of Trinidad Oil's assets to Texaco Trinidad will bring the Trinidad operations into closer relationship with the world-wide activities of The Texas Company. There will be no changes in the industrial or labor policies of the new company.

More than 2.7 million *Texaco credit cards, made of a lightweight plastic, have been issued by The Texas Company to introduce the new Texaco Speed-Charge Service, one of the nation's largest credit systems. A time-saving feature of the new Texaco Speed-Charge Service is a streamlined imprinter used at the service station. This new device prints 80 per cent of the invoice in one quick motion, with precision and accuracy. The new system is of unique convenience to motorists because it is honored for credit purchases by more than 35,000 Texaco dealers in every one of the 48 states, as well as throughout Canada.*

Heads New Foreign Producing Department

Responsibility for all of Texaco's exploration and producing interests in Canada, Latin America, and West Africa has been consolidated into a single, new department—the Foreign Producing Department (Western Hemisphere and West Africa). A. W. Baucum is General Manager.

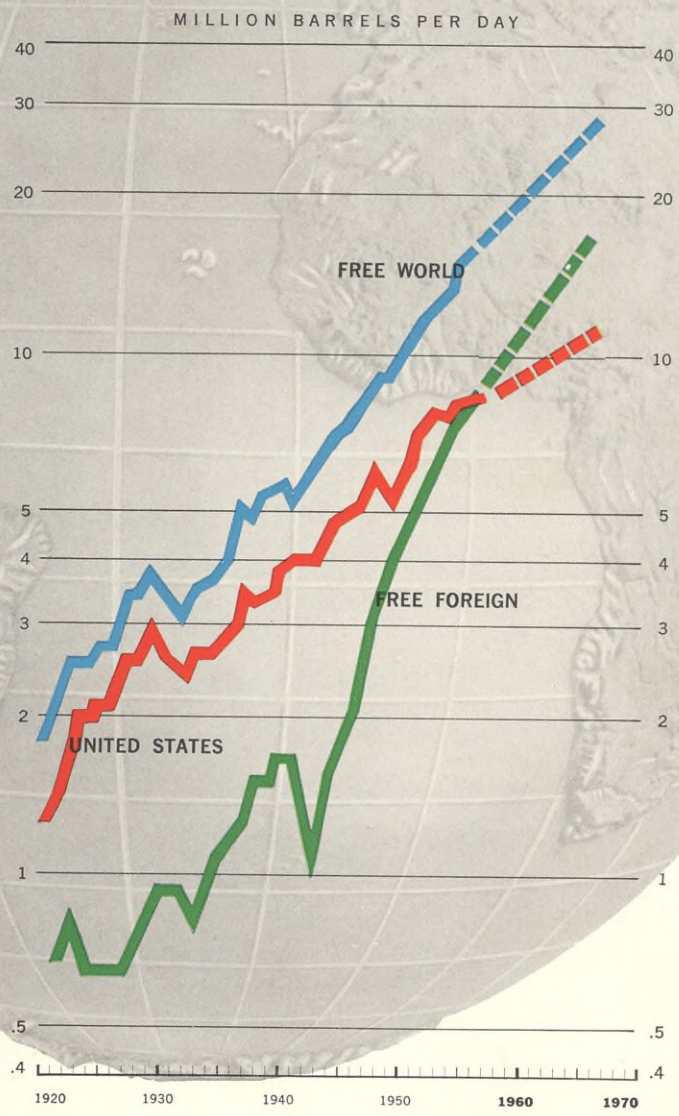
Mr. Baucum, who was graduated from Texas A. & M. College with a B.S. degree in Petroleum Engineering in 1934, started work for Texaco in the Domestic Producing Department the same year. After various field assignments, he served in engineering and managerial capacities in Tulsa and Houston until 1950, when he was transferred to New York as Assistant to the Vice President in charge of the Domestic Producing Department.

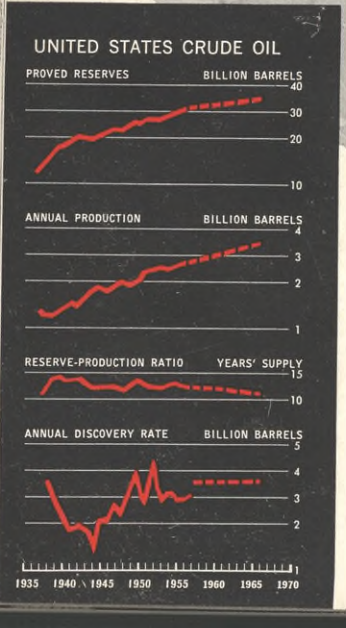
He was named Assistant to the President of the Company in 1954, and had been General Manager of the Foreign Operations Department since 1956. •

A. W. BAUCUM

Hanging out seismograms to dry like so much linen, a member of seismic survey crew in the Duri area displays the tidiness characteristic of Sumatrans.

FOR IMMEDIATE CONSIDERATION





PETROLEUM PRODUCTION IN THE FREE WORLD

Petroleum demand in the free world, according to a study by The Chase Manhattan Bank, will average 28.5 million barrels a day by 1966. At that time, according to the same study, the United States will be producing liquid petroleum at the near capacity rate of 11 million barrels a day. Particularly in view of the projected crude oil production trend in the United States depicted at left, the need for 17.5 million barrels of production in other areas of the world is obvious. The availability of foreign sources of crude oil to the United States—such as those in Central Sumatra *(see* The Search for Jungle Oil *on Pages 11-21)*—is essential to the future security and economic well-being of our country.